analogous arrangement of cells and fibres in the posterior portion of the cord, save that the number of cells is fourteen, and that the large fibres coming from them pass cephalad to the anterior end of the cord. In this course they give off fine branches, but undergo little diminution in size, and finally terminate rather abruptly at the head end. (The failure of some of these colossal fibres to diminish in size during their course is a fact that needs further study.)

Functional Nervous Diseases, their Causes and Treatment. Memoir for the Concourse of 1881–1883, Académie royale de médecine de Belgique, with a supplement on the anomalies of refraction and accommodation of the eye and ocular muscles. GEORGE T. STEVENS. New York, D. Appleton & Co., 1887.

The title of this book is quite misleading, for the discussion of functional nervous diseases and treatment is almost exclusively limited to the relations which abnormalities of the eyes and the ocular muscles may hold to them. The author has particularly noticed that the eyes are abnormal in a large number of cases of functional nervous diseases, and further has found it possible to cure and relieve many of them by treating the eyes. He recognizes that unstable nervous systems are found, that the condition of instability may be hereditarily transmitted, and that the irritation proceeding from disordered eyes may be a stimulus strong enough to produce a functional disturbance in an unstable nervous system, without, perhaps, making it very plain by what he says that any strong stimulus may produce the same result, and that the instances which he presents are to be considered as special examples of this well recognized fact.

Studien über den feineren Bau des Geschmacksorgans. FRIEDRICH HERMANN. Erlangen, 1887. Druck der Universitätsbuchdruckerei von E. Th. Jacob. 8vo, SS. 41.

The first part of this monograph is occupied with an historical review and critical discussion of the results and conclusions reached by various investigators respecting the more intimate structure of the taste-bulbs. The remaining portion contains the results attained by Hermann, who confined himself, almost exclusively, to an examination of the foliate papilla of the rabbit. The supporting cells of the taste-bulbs, he says, are not flat cells, as supposed by some previous observers, but are spindle-shaped cells filled with fluid. They are of two kinds, inner and outer supporting cells. The outer cells, which he designates "pillar cells," and which constitute the true supporting element of the bulb, are pyramid or spindle-shaped cells, having their basal ends divided into a number of fine processes. The cell-body is marked by a distinct network of fine meshes. The nucleus is situated in the lower half of the cell-body, and contains two or three nucleoli. The inner supporting cells, which are fewer in number than the preceding, are cylindrical in form, having enlarged bases which break up into fine processes. The peripheral end of these cells does not bear needle-shaped processes. The nucleus is elliptical and lacks true nucleoli. These cells, Hermann thinks, may be those described by Schwalbe as "staff cells," and supposed by him to be sensory in function. Hermann describes a third kind of supporting cell, flat or conical in

shape, and which rests upon the mucous membrane at the base of the bulb. These cells, of which there are from two to four in each bulb, he calls "basal cells of the buds." They are furnished with an oval nucleus, and send out many delicate processes which divide dichotomously, and, by means of the network thus formed, are in connection both with each other and with the stroma of the mucous membrane. In transverse sections through the bulbs, the basal cells are seen to form a protoplasmic net, in which the author sees an analogous formation to the olfactory mucous membrane. In the stroma underlying the bulbs are dense fasciculi of very fine nerve-fibrils, which disappear in the protoplasmic net of the basal cells. Within the bulbs frequent examples of nuclear division are present. Karyokinetic figures were seen most frequently in the basal cells, and very rarely in the "pillar cells." Hermann, from this fact, ascribes to the "basal cells" the rôle of acting as compensating cells for the taste-bulbs. The granular masses of v. Vintschgau he looks upon as degenerate "pillar cells." Respecting the taste-cells, he adds but little to what is already known. The number of these cells, he thinks, has been underestimated, there being, according to his statement, from ten to fifteen nerve-cells in a bulb. Passing from the gustatory pore inwards, he recognizes a second circular opening (within which may be seen the peripheral terminations of the "pillar cells"), for which he suggests the name "inner gustatory pore." F. T.

Untersuchungen über die Papillae Foliatae et Circumvallatae des Kaninchen und Feldhasen. O. Drasch. Abhandl. d. K. S. Gesellsch. d. Wiss., Bd. XXIV, S. 231-252. Mit 8 Tafeln.

In a former memoir (*Sitzb. d. k. Akad. d. Wiss. Wien,* Bd. 88, Abth. III, 1883) Drasch published the results of an investigation of the intimate structure of the foliate papilla of the rabbit and hare. The present paper deals in general with the same subject, and is designed to supplement his earlier treatise on the taste organs in mammals. In the first paper Drasch made the statement, which he has since been able to confirm, that the sensory cells present in the bulbs could not be a criterion for the sum of the taste-fibres of the glosso-pharyngeus nerve. In other words, the number of nerve-fibres into which the glosso-pharyngeus divides, directly below the bulb region of the various taste organs, far exceeds the sum of all the sensory cells in those organs. Beneath the basal membrane of the secondary leaf of the papilla foliata is a plexus formed of medullated nerve-fibres. From this plexus, fibres, corresponding in number to the sum of the sensory cells, go directly to the bulbs. Other fibres, more numerous, pass between the bulbs to the epithelium situated above them. Many fibres, however, terminate in the membranous stroma. Below the bulb region, in the entire width of the leaf, is found a connected stratum of ganglion cells which contribute to the multiplication of the fibres. In addition to the foregoing investigation, Drasch noted the changes produced in a papilla when subjected to various kinds of stimuli. If a normal papilla be pressed upon by a glass rod or stroked with a brush, no secretion of the glands follows; but if a needle or bristle be introduced into a furrow and moved about, secretion takes place. Weak induction shocks applied to the surface of a